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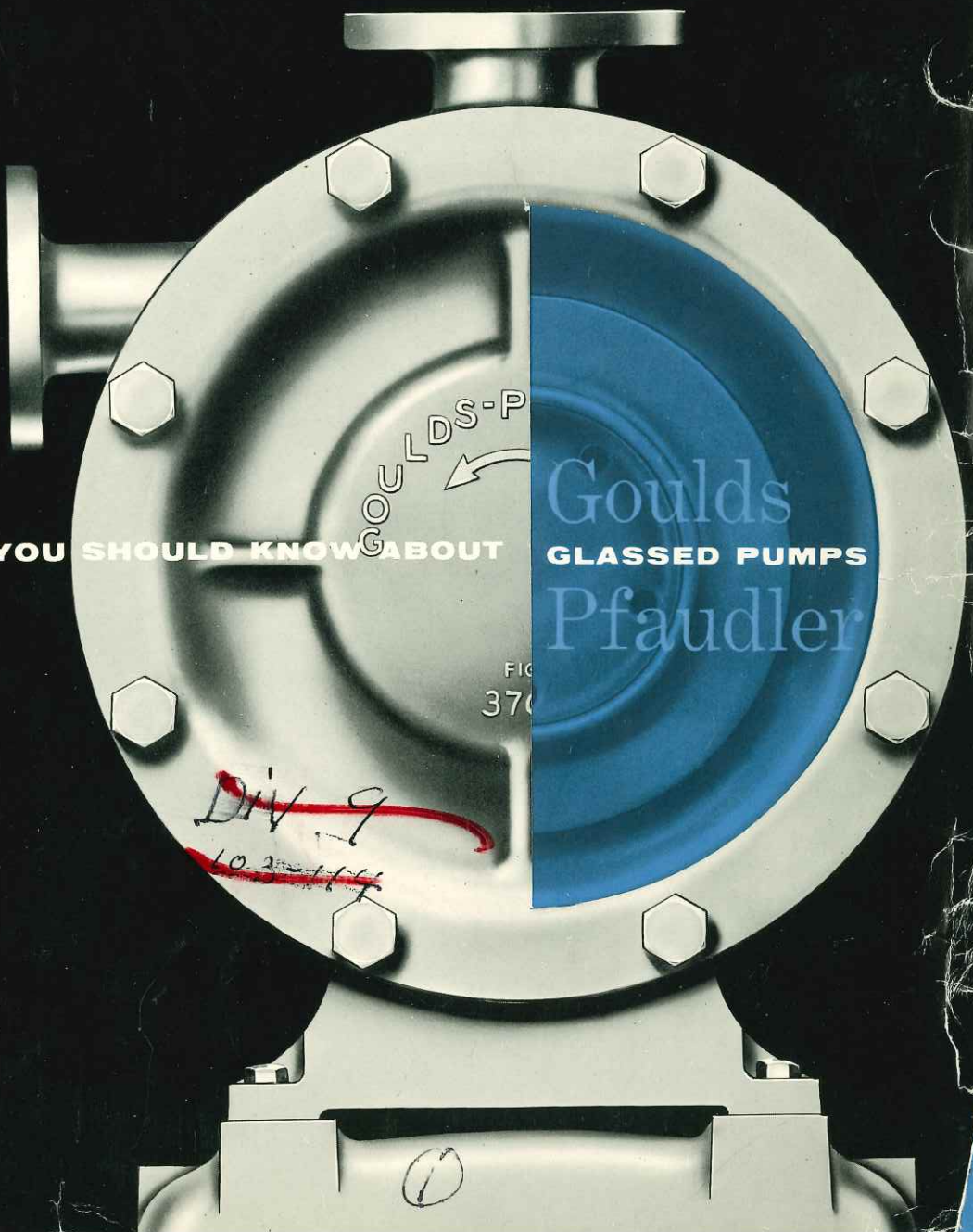
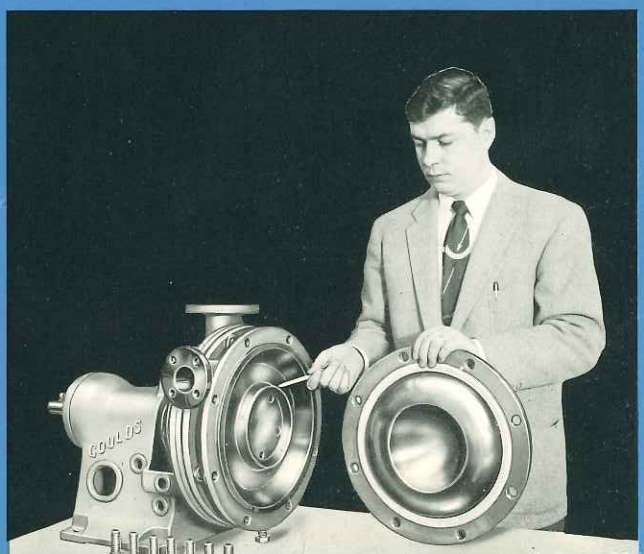
it's what's inside that counts



FACTS YOU SHOULD KNOW ABOUT GLASSED PUMPS

• Pumping has long been the unsolved problem in the handling of corrosive materials. Glassed-steel reactors, kettles, tanks plus glassed metal or glass pipes have been available to industry for some time. But, generally speaking, the pumps used with this equipment were necessarily built of various metals selected to meet the individual conditions of service. Frequently pump life was measured in months, in some cases weeks. Replacement costs of pumps and parts were high and downtime interfered with production schedules. It is not surprising then that the chemical process and allied industries have accepted the GOULDS-PFAUDLER Glassed pump as one of the most valuable contributions to plant equipment in recent years. We welcome the opportunity to tell you more about this remarkable pump in the following pages.

a new revolutionary answer to

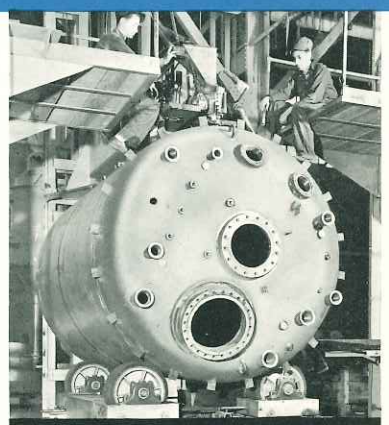


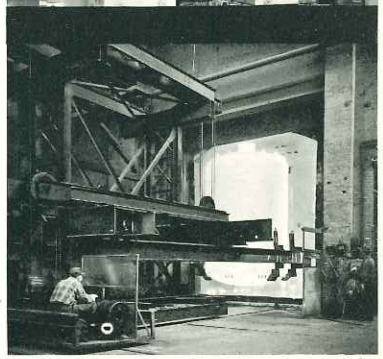
GOULDS-PFAUDLER Glassed Pumps

your corrosive pumping problems

Goulds
GLASSED PUMPS
Pfaudler

Goulds-Pfaudler





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glassed pumps

A MUTUAL DEVELOPMENT OF TWO OF THE COUNTRY'S LEADERS IN INDUSTRY

GOULDS PUMPS INC.

• Keeping pace with the rapidly changing requirements for fluid handling brought about by the technological progress made in the industries of the country, particularly the chemical process and allied industries, has been one of the principal reasons why Goulds Pumps Inc. enjoys its present position of being one of the leaders in the manufacture of centrifugal pumps.

Founded in 1848 in the village of Seneca Falls, N. Y., where in its plant in 1850 the first iron hand pump was cast, its growth has been steady and continuous. Today it operates the largest plant in the world devoted exclusively to the manufacture of pumps. From its foundry, one of the largest independently operated in the East, down through its machine and assembly floors to its fully equipped test floor, the most modern machinery is in evidence.

But while up-to-date plant facilities are vitally essential for the production of present day industrial equipment, of more importance to the prospective user is the staff of engineers who design and select the best pump to meet the user's most exacting requirements. Goulds engineering and application departments are staffed with engineers who not only know pumps from A to Z, but are well grounded through years of experience in such heavy pump using industries as paper and pulp, chemical processing, petroleum and petro-chemicals. Intimate knowledge of the user's requirements is vitally important if he is to obtain "the best pump for the job." In the field, too, Goulds personnel are all trained engineers who can readily interpret a user's most exacting requirements into a pump that will provide the best service at the most economical price.

Now, with the availability of the GOULDS-PFAUDLER Glassed Pump, a mutual development of two of the leading manufacturers in their fields, Goulds offers the only truly corrosion-resistant centrifugal pump.

THE PFAUDLER CO.

• Glassed-steel for industrial process equipment originated with and was pioneered by The Pfaudler Co. of Rochester, New York. Organized in 1884, Pfaudler is engaged principally in the engineering, manufacturing and marketing of glassed-steel and alloy equipment for the chemical, pharmaceutical, brewery, dairy and food process industries. International in scope, its plants are located in Rochester, New York; Elyria, Ohio; Germany; Great Britain; Japan; and Mexico.

Late in 1957, Pfaudler further diversified through a merger with The Permutit Company to form Pfaudler Permutit Inc. This brought about greater interest and coverage in the areas of water conditioning and ion exchange.

A truly unique construction material, glassed-steel is comparable to laboratory glassware in terms of corrosion resistance with the further advantage of providing the working strength of steel. This basic material is produced and fabricated by Pfaudler.

Through more than seventy years experience, Pfaudler has mastered the fabrication of glassed-steel in the forms of reactors, storage and mixing tanks, columns, evaporators, crystallizers, vats and kettles. High corrosion resistance being its main feature, glassed-steel also exerts no catalytic or contaminating effects due to no metal contact with the product, sticky materials will not cling to its smooth surface, it is easily cleaned and sterilized, and it offers a wide range of operating conditions. High temperature firings lock glass to metal making it tough and durable. Only severe mechanical impact can damage the glassed surface and then, only locally, since the surface will not crack or shatter.

Glassed-steel answers a need unanswered by any other material and is credited, in part, to the successful volume production of chemicals, reagents, vitamins, drugs, plastics, paints, resins, polymers, synthetic rubber, beer, ale and etc.

The significance, then, that Goulds and Pfaudler should unite in the glassed centrifugal pump is one of logical development combining the best of two industrial pioneers.

New in concept, and being the only pump of its kind on the market today, many questions naturally arise as to the construction and applicability of Goulds-Pfaudler Glassed Pumps to the pumping of corrosives. We hope some of these questions will be answered in this bulletin.

NOW – Pump Corrosives in glass

Goulds-Pfaudler Glassed PUMP economically resists corrosion

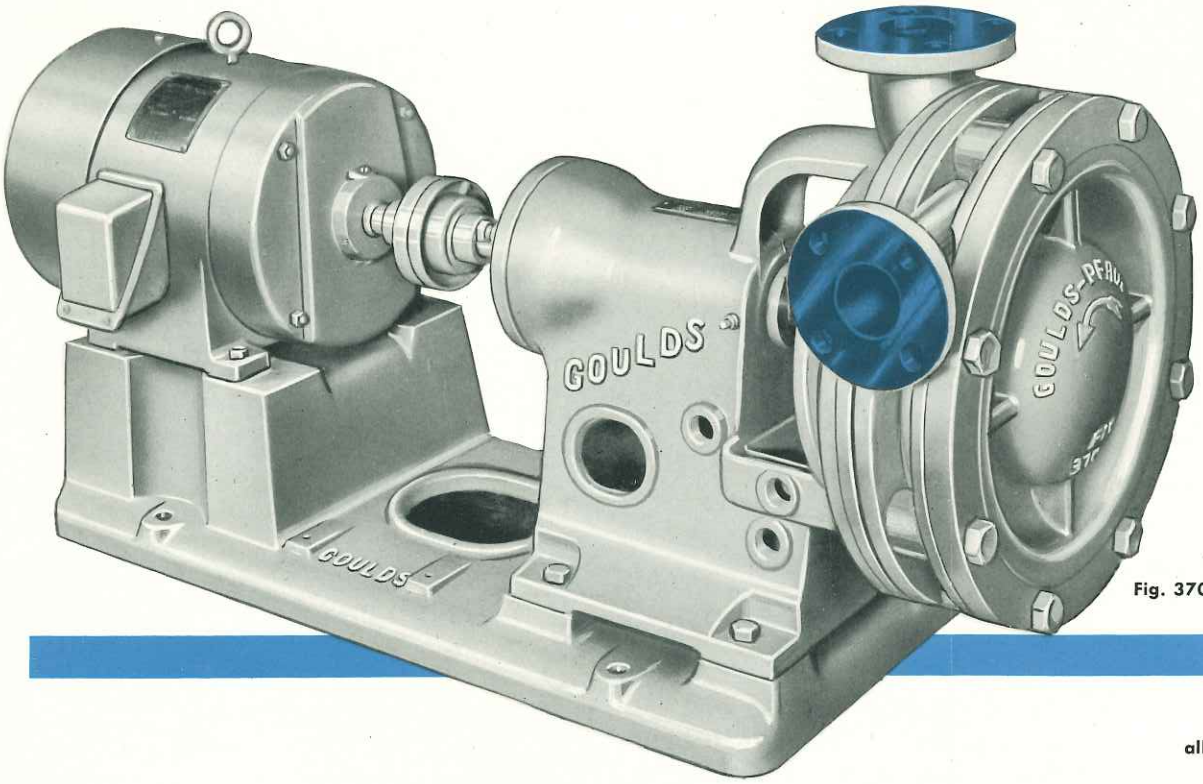
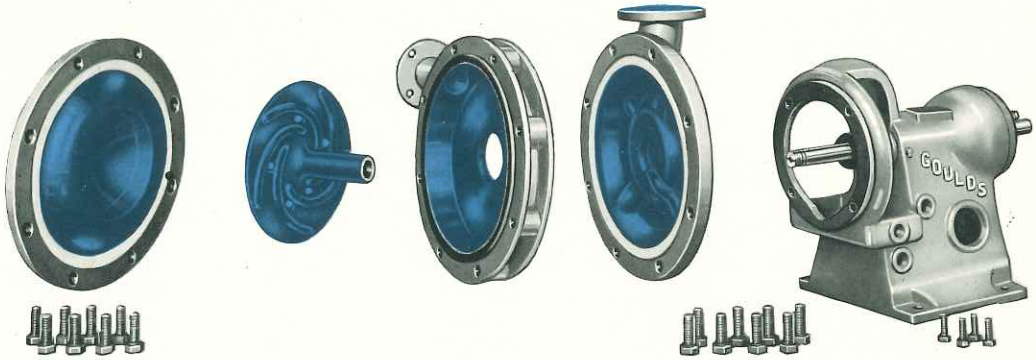


Fig. 3708

Exploded view showing all surfaces coming in contact with liquid, glassed

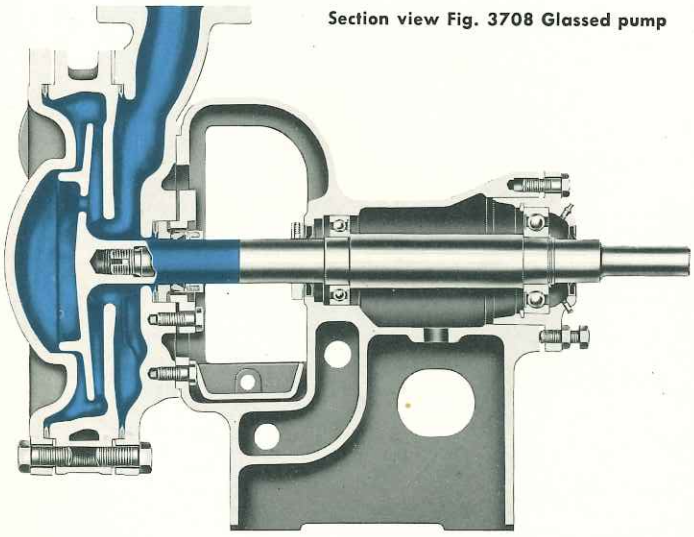


• While new in principle, hundreds of Goulds-Pfaudler Glassed Pumps are now in operation in many of the nation's leading chemical plants, operating satisfactorily handling the most corrosive liquids encountered in process work. In the Goulds-Pfaudler Glassed Pump, the strength of metal is combined with the corrosive resistance of glass. Every part of the pump coming in contact with the liquid is glassed! These remarkable pumps resist corrosion just as laboratory glassware does, yet they are strong and sturdy and long service life is the rule not the exception.

In order to facilitate glassing, a three-piece casing is used consisting of a suction piece, a casing and a casing cover with a partings sealed by retained Teflon envelope gaskets. Position of the suction connection may be top vertical or 90° either side of vertical while the discharge connections may be in any one of four to best suit the installation. One vitally important feature in the design is the location of the stuffing box in the suction side of the impeller. Pressure in the stuffing box is only the suction head or pressure under which the pump operates, thus insuring long mechanical seal or packing life.

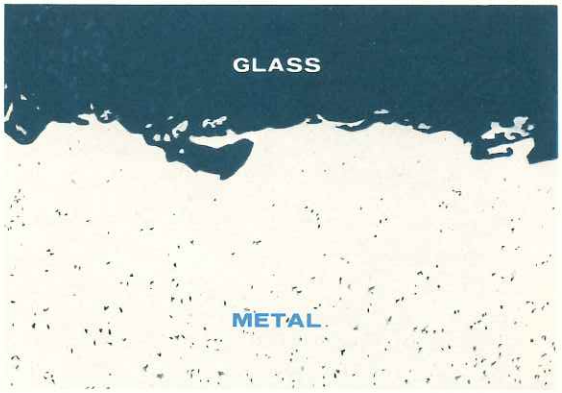
The impeller is of the semi-open type designed especially for glassing. The impeller hub, ground to size extends out beyond the stuffing box area, providing a rotating member without internal joints in contact with the liquid. Mechanical seal of the outside type is standard but a completely Teflon packed stuffing box can be furnished if desired. The support head has wide openings giving ready access to the stuffing box and is provided with two ball bearings isolated from the casing by cooling chambers to prevent heat transfer from the casing to the bearings. Axial adjustment of rotating element for proper impeller clearance is obtained by a simple but positive external means.

The illustrations on this and the preceding page show the simplicity of construction of the GOULDS-PFAUDLER GLASSED PUMP. More detailed information on material specifications, sizes, ratings, etc. will be found in Bulletin No. 725.2, copy of which will be gladly sent on request.



Section view Fig. 3708 Glassed pump

Micro-photograph of glass-to-metal bond



Questions and answers about Goulds-Pfaudler glassed pumps

Q	A
What is glassed metal?	It is the permanent fusing of glass to metal in successive applications and firings. A chemical action takes place between glass and metal during high temperature firing resulting in etching of the metal which produces a powerful mechanical interlocking and chemical bonding of glass to metal.
How is glass applied?	After initial firing of the casting to about 1500°F, dry powdered glass is dusted on while the casting is still red hot. Successive firings and applications produce the required thickness of glass.
What is the glass thickness?	A minimum of .040″.
Is glassed metal tough?	Yes, it is tough and has surprising structural strength resulting from the bracing of the glass by its metal backing, together with the toughening effect of the compressive forces built up in the glass itself as it cools after firing. Glassed metal withstands excessive mechanical shock and will not shatter.
Does glassed metal resist thermal shock?	Yes. Extended field experience under general use conditions demonstrates no serious effects from thermal shock. For best results, we recommend that sudden temperature changes be held to a maximum differential of 100°F.

What is the base metal?	It is an alloy cast iron especially selected for its physical and chemical properties which make it especially adapted for glassing.
How corrosion resistant is the base metal?	It is similar in its corrosion resistance to cast iron and therefore the exterior of the pump should be kept protected with paint against drippage and corrosive environment.
Will acid accumulation on the pump exterior cause interior glass "jumping"?	No. The base metal which has been selected has a structure that does not permit the passage of nascent hydrogen.
What kind of glass is used?	It is a boro-silicate glass especially formulated for pump application incorporating the corrosion resistant features of Pfaudler glassed-steel tanks and reactors. It offers high corrosion resistance to all acids, except hydrofluoric, even at elevated temperatures to 350°F and to alkalies at moderate temperatures.
How can the effect of new or uncommon corrosives on glass be determined?	Laboratory facilities are available for corrosion resistance testing of specific liquids. A gallon of the solution together with complete operating conditions sent to Goulds Pumps, Inc., Seneca Falls, N. Y. will enable complete testing at no cost.
Is corrosion resistance the same on machined glassed surfaces?	Yes, extensive tests prove there is no loss of corrosion resistance as a result of machining glass since the chemical composition of the glass is constant throughout. The loss or removal of the "fire polish" or glaze of the glass does not affect its corrosive resistance.
Can glassed pump parts be repaired?	Yes, under certain conditions, temporary repairs can be made. Due to technical and economical reasons permanent repair or complete reglassing of damaged parts is not practical.
How are glassed parts tested?	Electric testers capable of detecting flaws or thin glass sections are used throughout the manufacturing process to insure quality. There is no tolerance or compromise allowed in testing. PARTS ARE PERFECT OR REJECTED. Field testers can be obtained from The Pfaudler Co.

Is the glass resistant to abrasion?

Yes. The glass is very hard [6 on the moh scale] and offers good resistance to abrasion. For approximation of expectant pump life an abrasion test is recommended. A sufficient quantity of the dry abrasive to produce 1 quart of slurry of required concentration should be sent to Goulds Pumps, Inc., Seneca Falls, N. Y. for this free service.

How is glass affected by erosion-corrosion?

Glass offers excellent resistance to erosion-corrosion since it is not dependent on a protective film formation for its resistance. Velocities which seriously increase the corrosion rate on metals, have little or no effect on glass.

Is there an advantage to glassed pumps other than corrosion resistance?

Yes, many polymers especially in the field of synthetic rubber and vinyl and styrene plastics will not adhere to glass, but will adhere strongly to metal surfaces, even when highly polished. Thus, glassed metal minimizes shut-downs for cleaning. Glass exerts absolutely no catalytic effect in any known case.

Are glassed pumps economical?

Yes, they are economical first, because their basic materials are readily available at low cost and because their fabrication is less expensive than that of certain alloys. Secondly, they provide economy in operation because of their versatility and most important of all, their extra long service life.

MECHANICAL DESIGN

Why is a three-piece casing design used?

This design allows free access to all internal parts to facilitate glassing. The three parts are held in alignment by machined male and female locks and the use of two sets of bolts not only hold together casing components but insures even gasket loads. The three-piece design also allows great flexibility in positioning the flanged suction and discharge connections.

What type gaskets are used?

All gaskets in direct contact with the pumpage are retained Teflon envelope type, which utilizes a resilient asbestos core shielded from the liquid by the corrosion resisting Teflon envelope.

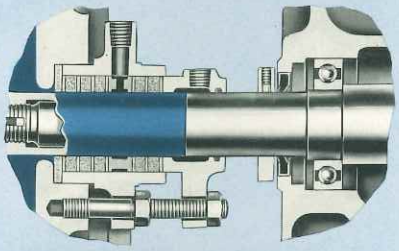
What is the advantage of the suction design?

The design, with the suction on the stuffing box side of the pump, insures only the usually low suction pressures acting on the stuffing box, thus giving long mechanical seal or packing life. This construction also permits inspection and maintenance of the pump interior by removal of casing cover without disturbing the suction or discharge piping connections.

How is the impeller held on the shaft?

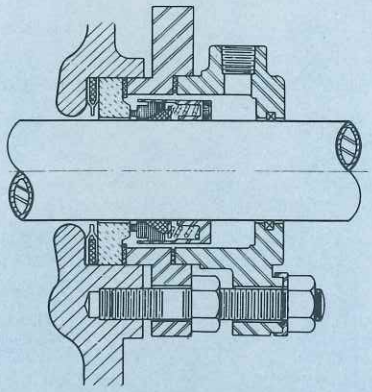
The impeller is threaded on the shaft with right hand threads which tighten against the clockwise rotation of the pump and is further locked by a fibre insert located in a milled slot in the shaft. The extended impeller shoulders against the shaft, thus forming a metal to metal joint which is further protected against environment corrosion by pressure sensitive Teflon tape.

Can a packed stuffing box be furnished?



Yes, the pump can be furnished with a packed stuffing box or easily converted in the field. It is a separate part cast of Gould-A-Loy 20 and is securely held to the suction piece at four points by two bolts and two studs, which extend out to hold and position the quench type gland. The box is furnished with die-formed Teflon packing rings, 1/16" tempered Teflon spacers, Teflon seal ring, and have pipe tap connections for in and out flushing.

Can mechanical seals be furnished?



Yes, mechanical seals of various designs and manufacture can be furnished to meet specific conditions of operation and customer preference. The seal usually furnished is a single unbalanced design mounted in an outside position thus providing a non-metallic unit since pumpage is in contact only with the non-metallic parts of the seal—ceramic, carbon and Teflon. The ceramic stationary seat is securely clamped against a Teflon envelope gasket and the glassed bottom of the suction piece recess. It is held by a Goulds-A-Loy 20 gland of four-bolt design which also pilots the quench gland available for use with mechanical seals when required.

When is a quench gland required?

Where toxic conditions may exist and it should also be used when pumping temperatures above 250°F are encountered.

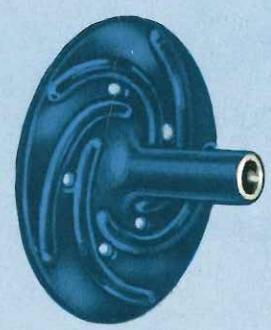
Is the hydraulic design conventional?

Yes, the hydraulic design of the "Glassed Pump" is conventional. It has been designed to facilitate glassing. All sharp corners are well rounded. There are no auxiliary openings to interrupt smooth flow, cause localized corrosion or adherence of product.

Is the impeller balanced?

Yes, the impellers are balanced before glassing. Tests show no unbalance after glassing.

How is balance of axial thrust accomplished?



By close running clearance between the impeller back ring and the casing cover bore, thus reducing the pressure exerted on the impeller shroud. Relief holes in the eye relieves the unbalanced pressures.

Can cut or reduced diameter glassed impellers be furnished?

Yes.

Is the impeller design suitable for pumping slurries?

Yes, the hardness and smoothness of the glass together with the semi-open impeller design make it suitable for handling slurries.

APPLICATION

What are maximum operating pressures and temperatures?

The maximum operating pressure is 150 psi any part of which may be suction pressure. Pump can be operated continuously up to 350°F.

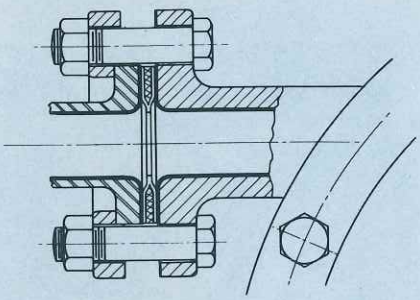
Is the "Glassed Pump" completely non-metallic?

Yes, the pumpage is in contact with glass and Teflon envelope gaskets in the casing proper and only non-metallic parts of the seal at the stuffing box area.

What bedplate is used?

A cast iron bedplate, designed specifically for the chemical industries, with a camber top which prevents accumulation of corrosive drippage. A stainless steel corrosion resistant drip pan positioned in the support head allows stuffing box drippage to be piped away.

What piping can be used with the "Glassed Pump"?



Any piping of standard diameters including glassed-steel pipe can be easily connected to the glassed flanges, including split-flange type found on most non-metallic pipe. Flanges are drilled per 125 pound A.S.A. specifications.

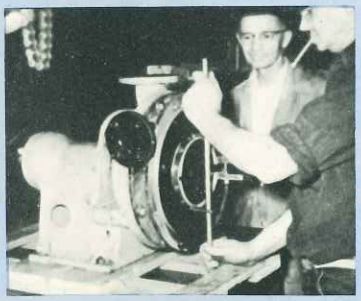
What flange gaskets should be used?

It is recommended that the Teflon envelope gaskets furnished with the pump be used.

What paint is used on the pump exterior?

Pump, bedplate, motor and coupling housing are painted with an acid-alkaline resisting chlorinated rubber base paint.

Are special maintenance tools required?



No, special tools are not required. It is however, recommended that an impeller removal wrench be used. This is available through Goulds Pumps, Inc. or may be made to the dimensions shown in the instruction book.

Is the Glassed Pump operated like any centrifugal pump?

Yes, the Glassed pump in all respects of operation is like any centrifugal pump and requires no special precautions. All pumps are supplied with a 28-page instruction book covering installation, operation and maintenance.

GOULDS PUMPS, INC.

Seneca Falls, N. Y.

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In Canada
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